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MESSAGE: Pursuant to your request, attached are proposed claims for discussion during the interview with Micheal Trenholm on July 10, 2003 at 2:00 p.m.

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MICRON.172A

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | |
|----------------|--|
| Applicant | : Deraa et al. |
| Appl. No. | : 09/945065 |
| Filed | : August 30, 2001 |
| For | : METAL SILICIDE ADHESION LAYER FOR CONTACT STRUCTURES |
| Examiner | : Junghwa M. Im |
| Group Art Unit | : 2811 |

PROPOSED AMENDED CLAIMS FOR INTERVIEW

1. (Twice Amended) An integrated circuit comprising:

a silicon substrate;

an insulating layer formed on the silicon substrate wherein the insulating layer has an opening that extends from an upper surface of the insulating layer to an upper surface of the substrate so as to expose the upper surface of the substrate;

a metal layer formed in the opening wherein a first portion of the metal layer is formed on the exposed upper surface of the substrate and reacts with silicon in the substrate to form metal silicide, wherein a second portion of the metal layer is formed on the sidewalls of the opening ~~does not contact the substrate~~ and remains unreacted; and

a metal silicide ~~adhesion~~-layer formed on an upper surface of the first and second portions of the metal layer, wherein the metal silicide layer comprises substantially the same composition as the metal silicide formed in the substrate, wherein the metal silicide ~~adhesion~~-layer adheres the second portion of the metal layer to a metal nitride layer that is subsequently formed ~~on the first and second portions of the metal layer~~ in the contact opening and fills substantially the entire opening, wherein a portion of the metal silicide layer directly contacts and combines with the metal silicide in the substrate to form a refractory metal silicide layer, wherein the refractory metal silicide layer extends approximately 50-150 Angstroms from the upper surface of the substrate and directly contacts the metal nitride layer.

Appl. No. : 09/945065
Filed : August 30, 2001

14. (Twice Amended) A high aspect ratio contact structure formed over a junction region in a silicon substrate, comprising:

an insulating layer, wherein the insulating layer defines a contact opening having an aspect ratio of at least 10:1, wherein the contact opening is formed over the junction region of the substrate and exposes a portion of the substrate;

a titanium layer formed in and adjacent the contact opening, wherein a first portion of the titanium layer is formed on the insulating layer and a second portion of the titanium layer is formed on the exposed portion of the substrate, wherein at least a portion of the second portion of the titanium layer contacts the exposed substrate and reacts with the silicon in the substrate to form titanium silicide, wherein the first portion of the titanium layer does not contact the substrate;

a titanium silicide adhesion layer formed on an upper surface of the first and second portions of the titanium layer, wherein the titanium silicide adhesion layer combines with the titanium silicide in the substrate to form a refractory metal silicide layer having a thickness of approximately 50-150 Angstroms; and

a titanium nitride contact fill formed in and adjacent the opening, wherein the titanium nitride is formed on an upper surface of the titanium silicide adhesion layer, wherein the titanium nitride contact fill is adhered to the first portion of the titanium layer by the titanium adhesion layer.